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Which Firms Have High Job Vacancy Rates in Canada?

by René Morissette and Xuelin Zhang

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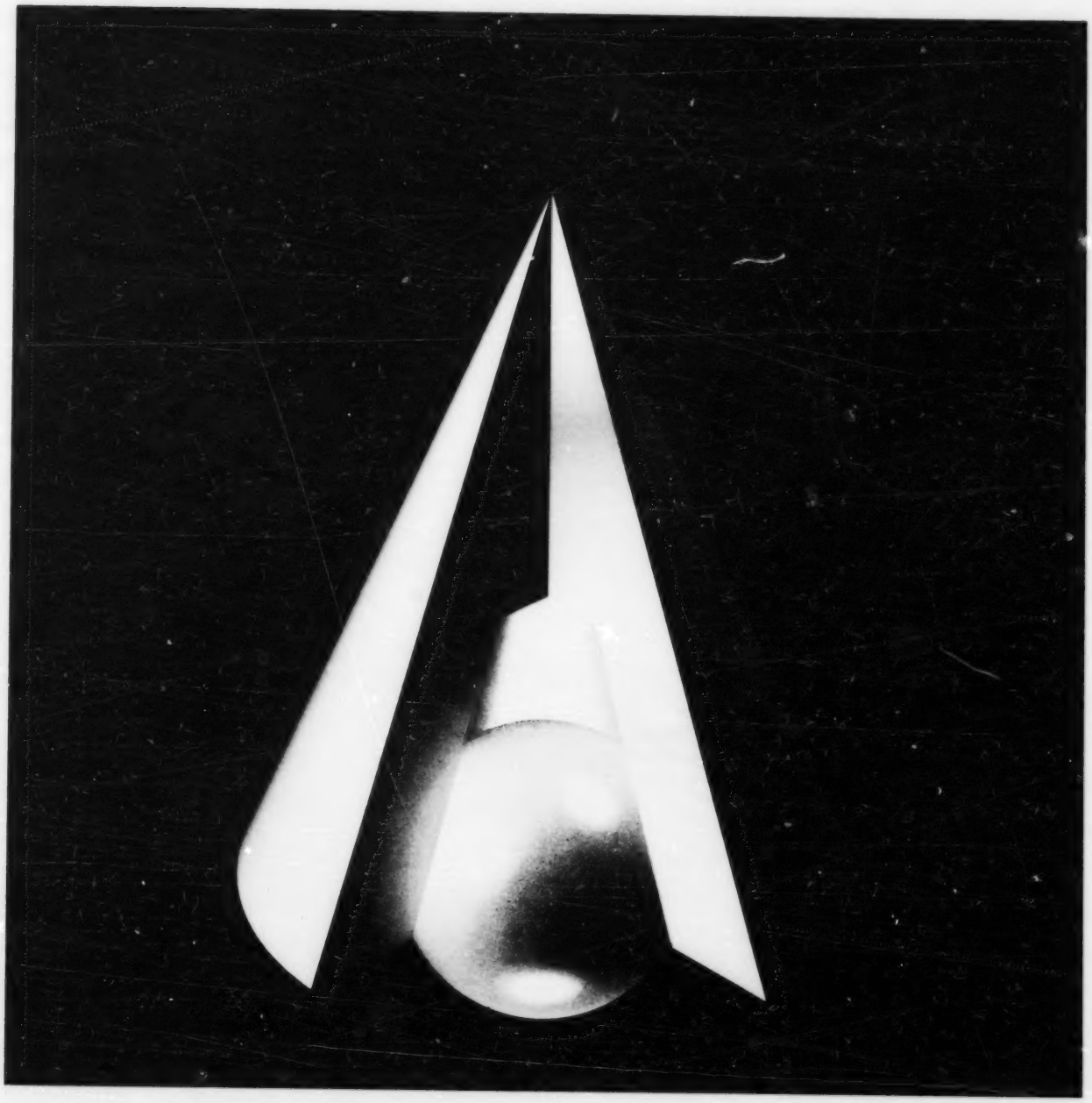

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Abstract

Since the Job Vacancy Survey conducted by Statistics Canada between 1971 and 1978, there was no data which directly measured job vacancies in Canada. Using data from the 1999 Workplace and Employee Survey (WES), we attempt to fill this gap. We study the determinants of job vacancies at the establishment level. We find that establishments with high vacancy rates in 1999 consisted of at least two types: 1) those employing a highly skilled workforce, innovating, adopting new technologies, increasing skill requirements, facing significant international competition and operating in tight local labour markets, and 2) those which were non-unionized, operated in retail trade and consumer services industries and were not part of a multi-location firm. In profit-oriented establishments, more than 40% of all job vacancies and 50% of long-term vacancies (i.e. vacancies unfilled for at least four months) originated from retail trade and consumer services industries, a sector that pays relatively low wages and has a high rate of labour turnover. This sector accounted for 30% of jobs in the private sector. This finding suggests that even in periods of strong growth in the high-technology industries, a substantial share of job vacancies is found outside those industries.

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Keywords: job vacancies, labour shortages, unemployment

I. Introduction

The economic expansion of the late 1990s has led to a renewed interest in labour shortages in Canada. The strong growth in employment of knowledge workers in the Canadian economy and the growing number of firms reporting hiring difficulties for skilled workers have raised the question of whether there was an insufficient supply of skilled labour in Canada (Gingras and Roy, 1998). The implicit assumption has been that most of the job vacancies were in the high tech sector. Despite this growing interest in labour shortages, there was, until recently, no nation-wide data which allowed analysts to either measure the number of job vacancies or identify the sectors facing the most severe labour constraints.[1]

The goal of this paper is to fill this gap. Using data from the Workplace and Employee Survey (WES) of 1999, we provide estimates of job vacancy rates in profit-oriented establishments. More precisely, we examine which firms have high job vacancy rates in Canada. Since the Job Vacancy Survey (JVS) conducted between 1971 and 1978 by Statistics Canada, WES is the first nation-wide survey which allows analysts to measure job vacancy rates.[2] While JVS estimated job vacancies by province, industry and occupation, it did not provide information on vacancy rates at the establishment level. Contrary to JVS, WES fulfills this latter requirement: it allows an establishment-level analysis of job vacancy rates.

As expected, we find that establishments employing a highly skilled workforce, innovating and adopting new technologies increasing skill requirements had high job vacancy rates in 1999. However, non-unionized establishments operating in retail trade and consumer services industries and belonging to a single-establishment firm also faced severe labour shortages. Thus, there are at least two types of establishments with high job vacancy rates.

In profit-oriented establishments, more than 40% of all job vacancies and 50% of long-term vacancies (i.e. vacancies unfilled for at least four months) originated from retail trade and consumer services industries, a sector that pays relatively low wages and has a high rate of labour turnover. This sector accounted for 30% of jobs in the private sector. This finding suggests that even in periods of strong growth in the high-technology industries, a substantial share of job vacancies is found outside those industries.

The plan of the paper is the following. In section II, we define the data and concepts used. A descriptive analysis is conducted in section III. The estimation strategy for the multivariate analysis is defined in section IV and estimation results are presented in section V. A conclusion follows.

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1 Due to lack of micro-data, previous Canadian research on job vacancies has concentrated on the relationship between vacancy rates (or the help-wanted index) and unemployment rates (Osberg and Lin, 2000; Archambault and Fortin, 1997; Gera et al., 1991; Reid and Meltz, 1979).

2 Statistics Canada has been producing the help-wanted index since 1962. The most recent consistent series starts in January 1981. While the help-wanted index allows an analysis of *trends* in labour shortages, it does not provide a measure of the *magnitude* of these labour shortages, i.e. the number of job vacancies.

II. Data and definitions

Between 1971 and 1978, Statistics Canada conducted the Job Vacancy Survey. This survey was conducted twice a month by both mail and interviews among employers representing approximately 90% of employment in Canada[3]. It was designed to allow estimates of the number of vacancies for detailed occupations and thus to provide useful information for manpower programs aimed at reducing the amount of mismatch in the labour market.[4] The survey was discontinued after 1978. As a result, before the advent of WES, no nation-wide survey was available to analysts to measure directly the number of job vacancies between 1978 and 1999 in Canada. WES now fills this gap.

The Workplace and Employee Survey is a linked employer-employee file: it consists of both employer and employee components. Employers are sampled by physical locations—the statistical unit that comes the closest to the concept of a workplace in which employer and employee activities can be linked. Employees are then sampled from employer-provided lists within each location.

The initial wave of WES was conducted during the summer and fall of 1999. Usable information was collected from 6,351 business locations and 24,597 employees, representing response rates of 94 percent and 83 percent, respectively.

The survey covers a broad range of topics of interest to a number of disciplines such as technology adoption, innovation, human resource practices, labour turnover and business strategies, among others. It also contains a section on job vacancies which includes the following set of four questions:

Question 3(a) How are vacant positions usually staffed? For all applicable categories[5], check only the most frequently used method.

- *From within the workplace*
- *From another workplace within the same legal company or business enterprise*
- *From outside the company*

---

[3] The excluded sectors were agriculture, domestic services, the military and fishing and trapping. Job vacancies were defined as jobs: 1) which were vacant for the entire survey day, 2) which employers tried to fill within four weeks prior to survey day (by advertising, contacting Canada Manpower Centres, interviewing walk-ins, etc.), 3) which were available immediately, 4) which were available to persons outside the firm. By definition, the following job openings were excluded: 1) those that had a future starting date and thus were not immediately available, 2) those for which no recruiting action was undertaken or recruiting action stopped four weeks prior to the reference day, 3) those that could be filled immediately from employers' or unions' waiting lists and thus were not vacant for the entire reference day, 4) those that were open only to employees of the firm (either working or on temporary layoff).

[4] The vacancy rate—the number of job vacancies divided by the number of jobs (where the latter is the sum of the level of employment and the number of vacancies)—varied between 0.4% and 1.3% during the 1971-1978 period. It was countercyclical and was generally higher in Ontario than in Quebec.

[5] The applicable categories are: a) managers, b) professionals, c) technical/trades, d) marketing/sales, e) clerical/administrative, f) production workers with no trade/certification, g) other.

Question 3 (b) At this location, are there any vacant positions that you are currently trying to fill?
Yes
No -------→ Go to Question 4 (a)

Question 3(c) In total, how many vacant positions are currently unfilled at this location?

Question 3(d) Of those, how many positions have remained vacant for four months or longer in the following categories:

A. Managers
B. Professionals
C. Technical / Trades
D. Marketing / Sales
E. Clerical / Administrative
F. Production workers with no trade / certification
G. Other

For each group with vacant positions for four months or longer, identify the reason(s) for the vacancies. (Check all that apply)
- *Too few applicants*
- *Most applicants lacked educational requirements*
- *Most applicants lacked job experience*
- *Most applicants declined job offer*

In this paper we use Question 3 (c). We define the job vacancy rate y_j of location j as the number of job vacancies (as reported in Question 3 (c)) in location j divided by location j's labour demand. Labour demand equals the number of people employed in a location plus the number of job vacancies.[6]

Perhaps the best way to define a job vacancy is through the concept of unemployment. On one hand, an unemployed worker is an individual 1) who has not worked at all during a reference period (e.g. last week), 2) who has undertaken, within the last weeks, some specific action to find a job and, 3) who is currently available to fill a position. On the other hand, a job vacancy is a job: 1) which is vacant for a given reference period, 2) for which employers have undertaken, within the last weeks, some specific recruiting action and, 3) which is available immediately. Furthermore, this unfilled position must be available to persons outside the location.

It is important to emphasize that, contrary to the Job Vacancy Survey of 1971-1978, WES does not impose this latter requirement since part of the job vacancies reported by the workplace may be filled from inside the location or the company (Question 3(a)). As a result, the job vacancy rates reported in this paper may overestimate the number of jobs available to unemployed workers since they include some positions available only to people inside the firm. Companies may fill these

[6] It is interesting to note that all the reasons included in the survey questionnaire for the 4-month vacancies could be explained by the possibility that these employers pay relatively low wages.

positions—through promotions or lateral moves—with existing workers and may not replace them through external recruitment.[7]

There is no consensus as to whether job vacancies are easier to measure than unemployment. Osberg and Lin (2000: S151) argue that:

"It is not clear, however, why a "vacancy" on the firm side of the labour market is inherently more difficult to measure than "unemployment" on the worker side of the market. After all, since firms typically employ multiple workers, the average firm is more often engaged in the search process than the average worker [...]. On both sides of the labour market, an unfilled match is costly and market participants have an incentive to recognize and correct the situation, so firms do in general know when vacancies exist. Although there may be some ambiguity for both workers and firms in estimating when search is serious, and at what wage rate a match would be acceptable, there does not seem to be any grounds for a presumption that employers are less capable or less honest than individual workers in answering surveys..."

In contrast, Ostry and Sunter (1970) identify three problems that are likely to arise in the process of collecting the data. First, defining vacancies as unfilled positions for which employers have undertaken some recruiting action will lead one to exclude some genuine vacancies. The reason is that "many employers will insist that they urgently require a particular type of labor but have given up looking because they are sure that action will produce no results" (Ostry and Sunter, 1970): like discouraged workers, these are discouraged employers. It may be difficult to obtain from such respondents a definite number of vacancies. Second, many organizations may have multiple locus of decision responsibility regarding recruitment and hiring and identifying these decision centers may be a complex task: in contrast, identifying whether an individual is unemployed or not is a relatively simple task. Third, complete or even partial statistical records of job vacancies may not exist in a given establishment or firm: in contrast the respondent or proxy respondent has a pretty good idea of the individual's labour force status.

However one settles this issue, it is important to note that WES takes some steps to reduce some of the problems associated with the measurement of vacancies. For instance, to minimize the difficulties associated with multiple locus of decision responsibility, WES asks the job vacancy questions to the primary respondent of the location. The primary respondent is a human resource person in a large firm (who preferrably works in the workplace, sometimes at the headquarters) and the business owner in a small firm.

WES samples profit as well as non-profit locations operating in all industries except farming, fishing, trapping and public administration. In this paper, we concentrate on locations which are profit-oriented organizations. Non-profit locations are excluded. Specifically, the focus of the analysis is on two samples: 1) all profit-oriented locations and, 2) profit-oriented locations for which at least one employee has responded to the survey. Our main findings are essentially the same for both samples. The first sample consists of 5,398 locations while the second sample includes 4,918 locations.

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[7] Another source of overestimation could be that some respondents in WES may report job vacancies for jobs available in the future as well as for jobs available immediately. In JVS, job vacancies are restricted to jobs available immediately. However, the empirical importance of this factor is likely to be small.

III. Overview

Table 1 presents job vacancy rates for the first sample. Only 13% of all profit-oriented workplaces had positive vacancies in 1999 (column 1). The number of jobs (i.e. employment plus number of job vacancies) in these workplaces represented 35% of all jobs available (column 2). Locations which had positive vacancies had a job vacancy rate of 7.8% (column 3). Multiplying column 2 by column 3 yields the unconditional job vacancy rate of 2.7% (column 4). This figure is very close to the job vacancy rate observed for all locations—profit-oriented and non-profit—, which equals 2.6% (Galarneau and Krebs, 2001).

This overall job vacancy rate 2.7% is higher than the 1% figure obtained from the WES pilot survey of 1996. There are at least two reasons for this difference. First, the Canadian labour market was much tighter in 1999 than in 1996: the unemployment rate dropped from 9.6% to 7.6% between these two years. The implication is obvious: job vacancy rates are expected to be higher in 1999 than in 1996. Second, part of the discrepancy could be due to the use of different samples between 1996 and 1999. In 1996, several industries were sampled only for specific provinces, rather than for all provinces.[8] This was not the case in 1999. One possible avenue for comparison would be to select in WES 1999 only the combination of industries/provinces that were sampled in the WES pilot survey of 1996. Because industries were coded using the 1980 Standard Industrial Classification (SIC) in 1996 and NAICS (North American Industry Classification System) in 1999, defining rigorously such a subsample in 1999 is almost impossible.[9] [10]

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[8] For instance, scale-based manufacturing was sampled in Ontario, retail trade and commercial services were sampled in Manitoba and Saskatchewan, finance and insurance in Quebec and business services in Alberta.

[9] Slight differences in the wording of the job vacancy questions are unlikely to have played a significant role. In 1996, the WES pilot survey asked, for those locations which had "any vacant positions currently unfilled despite active recruitment", "the number of vacancies that, despite active recruitment, have been unfilled". In contrast, WES 1999 asked, for those locations which had "any vacant positions that you are currently trying to fill" (Question 3 (b)), the number of "vacant positions [that] are currently unfilled at this location" (Question 3 (c)). It is unlikely that a substantial fraction of firms are trying to fill vacant positions without active recruitment.

[10] It is worth remembering that public administration is excluded from the two samples used in the paper. The Job Vacancy Survey showed that, between 1971-I and 1978-IV, average vacancy rates were very similar in this sector (0.84%) and in the whole economy (0.78%) (Annual report on job vacancies, Statistics Canada, Cat. 71-203, 1978, Table 19, pp. 57-58). The strong expansion of the public sector in the mid-1970s may explain why vacancy rates were not lower in this sector, compared to the whole economy. In the environment prevailing in 1999, there are good reasons to believe that the vacancy rate in public administration should be somewhat lower than in the rest of the economy. First, quit rates are much lower in public services (2.0% in 1994) than in the whole economy (6.0% in 1994) (Permanent layoffs, quits and hirings in the Canadian economy, 1978-1995, Statistics Canada, Cat. No. 71-539-XPB, Table 1, pp. 25-27). As a result, job vacancies which are opened to replace former employees should be lower in public administration. Second, between 1998 and 1999, employment growth was lower in public administration (-0.6%) than in the whole economy (3.0%) (Labour Force Historical Review 1999, CD-Rom 71F0004XCB, Table 12AN). Job openings to recruit new employees should then be lower in public administration. For these two reasons, it is reasonable to argue that the overall vacancy rate of 2.6% found by Galarneau and Krebs (2001) for all WES locations probably constitute an upper bound for the job vacancy rate that applies to the whole economy. However, the magnitude of the overestimation is likely to be quite small. Assuming that the job vacancy rate in public administration equals 0%, simple calculations—based on the total number of vacancies in WES (286,415), the total level of employment in WES (10,777,543) and the employment level in public administration in 1999, as taken from the Labour Force Survey

Table 1 also shows vacancy rates for a selection of location characteristics. One important feature of the data is that while the fraction of locations with positive vacancies increases with location size (column 1), conditional vacancy rates decrease with location size (column 3). Because the second effect dominates the first, unconditional vacancy rates generally decrease with location size (column 4).

This pattern is noted by Holzer (1994), who also examines establishment-specific vacancy rates for a sample of U.S. firms.[11] As we will see below, it has important implications for the specification of an econometric model of job vacancy rates. Specifically, because the effect of location size on the probability of having positive vacancies differs from the effect of location size on conditional vacancy rates, one needs an econometric model which contains two sets of coefficients for each explanatory variable.

Several interesting patterns emerge from Table 1. Relatively high (unconditional) vacancy rates are observed among locations which are not part of a multi-location firm. The same pattern is observed among workplaces which, during the past year, have implemented an innovation or have introduced a new technology increasing skill requirements. Locations which are non-unionized or which have no grievance system also exhibit relatively high vacancy rates. Workplaces facing high labour turnover rates—defined as the sum of quit rates, retirement rates and firing rates—have high vacancy rates. Workplaces which provide training also have higher-than-average vacancy rates. This is probably due, at least in part, to the fact that those which experience labour shortages respond by providing training to their employees (Baldwin and Peters, 2001).[12] As expected, locations which operate in tight local labour markets (i.e. local labour markets with low unemployment rates) face more severe labour constraints than others.[13] Contrary to our expectations, locations which have a separate human resources unit do not have fairly low vacancy rates.

There are substantial differences in vacancy rates across regions. Unsurprisingly, Atlantic provinces display the lowest vacancy rates (1.5%) while Ontario and Alberta show fairly high vacancy rates (3.5% and 3.7%, respectively). Locations operating in retail trade and consumer services industries display the highest vacancy rates (3.9%). This stands in sharp contrast with locations in forestry, mining, oil and gas extraction and those in primary product manufacturing, which exhibit fairly low vacancy rates (0.8% and 1.3%, respectively).

(773,900) imply that the economy-wide job vacancy rate (i.e. excluding only agriculture, fishing and trapping) would still equal 2.4%.

[11] The source of the data is the Employment Opportunity Pilot Project (EOPP) Surveys of Firms in 1980 and 1982. While there is a large set of microeconometric studies on unemployment and job search, little empirical work has been devoted to the study of vacancies at the firm level. Apart from studies looking at the determinants of vacancy *durations* (Burdett and Cunningham, 1998; Van Ours, 1989; Van Ours and Ridder, 1991a, 1991b, 1992; Roper, 1988), Holzer (1994) is the only study which examines the determinants of vacancy *rates* at the firm level.

[12] If this is the case, then training is an endogenous variable with respect to job vacancy rates.

[13] Local unemployment rates are defined as the unemployment rates of males aged 25-54, by economic region.

Table 1 also distinguishes the information and communication technology sector (ICT) from other industries.[14] Vacancy rates of the ICT sector (2.9%) are very similar to those of other sectors (2.7%).

Average compensation per employee (i.e. annual payroll plus non-wage benefits divided by number of employees) is the variable for which there is the greatest variation in vacancy rates. Firms located in the bottom decile of the compensation distribution show vacancy rates (7.1%) three times as high as those of firms located in the top decile (1.9%). However, the relationship between average compensation and vacancy rates is not monotonic. At the very least, this pattern suggests that low-paying firms may have higher vacancy rates than their high-paying counterparts. Since average compensation is endogenous with respect to vacancy rates—high vacancy rates may lead firms to increase wages to solve the vacancy problem—a definitive statement about causality cannot be made by simply looking at Table 1.

So far, we have examined job vacancy rates looking at one dimension at a time. The bottom part of Table 1 considers three dimensions simultaneously. It shows that locations whose percentage of skilled workers is higher than average (37.6%) and which, during the past year, have implemented an innovation and have introduced a new technology increasing skill requirements have vacancy rates of 3.9%.[15] These locations account for 6% of all jobs in the private sector (column 6). Furthermore, non-unionized locations operating in retail trade and consumer services industries and not belonging to a multi-location firm have even higher vacancy rates (5.3%). These locations account for fully one-third of all job vacancies (column 7).

One important question is whether job vacancies are "frictional" or "structural". One way to draw this distinction is to compare job vacancy rates for all vacancies to those for long-term vacancies, i.e. those lasting four months or more. Table 2 presents these two vacancy rates by industry. Column 1 simply replicates the numbers of column 4, Table 1 while column 2 shows the long-term vacancy rates. Overall, the long-term vacancy rate equals 1.3%, compared to 2.7% for the vacancy rate including all job vacancies.

---

[14] The information and communication technology sector is defined by the 23 following 5-digit NAICS industries: 1) commercial and service industry machinery manufacturing (33331), 2) computer and peripheral equipment manufacturing (33411), 3) communication and energy wire and cable industry (33592), 4) semiconductor and other electronic component industry (33441), 5) telephone apparatus manufacturing (33421), 6) radio and television broadcasting and wireless communication equipment manufacturing (33422), 7) audio and video equipment manufacturing (33431), 8) navigational, measuring and control instruments manufacturing (33451), 9) computer, computer peripheral and pre-packaged software, wholesaler-distributors (41731), 10) electronic components, navigational and communications equipment and supplies, wholesaler-distributors (41732), 11) office and store machinery and equipment, wholesaler-distributors (41791), 12) cable and other program distribution (51322), 13) wired telecommunications carriers (51331), 14) wireless telecommunications carriers (except satellite) (51332), 15) telecommunications resellers (51333), 16) satellite telecommunications (51334), 17) other telecommunications (51339), 18) office machinery and equipment rental and leasing (53242), 19) software publishers (51121), 20) other information services (51419), 21) data processing (51421), 22) computer systems design and related services (54151), 23) electronic and precision equipment repair and maintenance (81121).

[15] Skilled workers are defined as employees who are managers, professionals or technical/trades workers. Flexible organizational practices exist in a location if, for non-managerial employees, one of the following aspects is observed: 1) employee suggestion program, 2) flexible job design, 3) information sharing with employees, 4) problem-solving teams, 5) labour-management committees, 6) self-directed workgroups.

The most striking finding in Table 2 is the fact that retail trade and consumer services industries account for a quite substantial share of labour shortages: more than 40% of all job vacancies and 50% of long-term vacancies originate from this sector. Note that this sector accounts for 30% of all jobs (employment plus vacant positions) (Table 1, column 6).

One could argue that, in retail trade and consumer services, several vacancies are filled from inside the location or company and, consequently, the numbers presented in the previous paragraph overstate the relative importance of this sector. While the number of vacancies available to people inside/outside the location/company is not available in WES, it is possible, using Question 3a, to calculate the percentage of workers for whom vacant positions are *usually* filled from outside the company. Table 3 presents these numbers. Whether we consider all profit-oriented locations or only those which have unfilled vacancies, workplaces in retail trade and consumer services usually fill their vacancies from outside the company as least as often (80% and 83%) as workplaces in the rest of the economy (77%). Hence, there is no evidence that vacancies in retail trade and consumer services are filled from inside the company more often than in other sectors.

IV. Estimation strategy

IV.1 Econometric issues

Because vacancy rates take non-negative values and because the vast majority of locations have zero vacancies, the empirical model must be of the Tobit form. However, because location size have different effects on the probability of having positive vacancies and on the conditional vacancy rates, two sets of coefficients are needed for each explanatory variable.[16] This precludes the use of the simple Tobit model. We use an adjusted Tobit model (Type 2 Tobit in Amemiya's (1985) classification system), which can be expressed as follows:

$$\ln(y_j) = y_{2j}^* \quad \text{if } y_{1j}^* > 0 \qquad (1)$$
$$\ln(y_j) = -\infty \quad \text{if } y_{1j}^* <= 0 \qquad (2)$$

$$y_{2j}^* = Z_{2j}\beta_2 + u_{2j},$$
$$y_{1j}^* = Z_{1j}\beta_1 + u_{1j},$$

where $\ln(y_j)$ is the natural logarithm of vacancy rate of location j, y_{1j}^* and y_{2j}^* are two latent variables defining the probability of a location having positive vacancies and the conditional vacancy rate of a location, respectively.[17] Z_{1j} and Z_{2j} are two vector of explanatory variables (which

[16] Another example in which an explanatory variable may have different effects on the probability of having non-zero values and on the conditional positive values occurs when analyzing the dependent variable "loss due to fire" and the explanatory variable "age of the building". New buildings will have a low probability of having fires but may have greater average losses when a fire occurs (see Lin and Schmidt, 1984).

[17] The likelihood function for this model is : $L = \Pi_0 * [1 - \Psi(Z_1\beta_1)] * \Pi_1 * \Psi((Z_1\beta_1 + \rho(y_2 - Z_2\beta_2)/\sigma) * (1-\rho^2)^{-1/2}) * \phi((y_2 - Z_2\beta_2)/\sigma)/\sigma$, where Π_0 and Π_1 denote the products over the censored and uncensored samples, respectively, $\rho\sigma = \sigma_{12}$, $\sigma_1^2 = 1$ and $\sigma_2^2 = \sigma^2$ (Leung and Yu, 1996:202). One can think of y_{1j}* and y_{2j}* as being generated by two distinct processes. The probability of having positive vacancies may depend on a location's *fixed* cost of posting vacancies while conditional vacancy rates may depend on the *marginal* costs associated

may have common elements) affecting the probability of having positive vacancies and the conditional vacancy rates, respectively, and u_{1j} and u_{2j} follow a bivariate normal distribution with correlation ρ.[18] [19]

One important question is whether high-paying/low-paying workplaces have low/high vacancy rates. This question poses a few challenges. First, because high vacancy rates may induce firms to raise their wages (at least for new entrants), observed wages are endogenous, perhaps more so for new entrants than for workers who have high seniority in the establishment. Second, when talking about high-paying establishments, we have in mind establishments which offer a wage premium, i.e. who offer high wages after *controlling for workers' (observed and unobserved) characteristics and for working conditions.*[20]

One possibility could be to take advantage of the fact that WES 1999 is a linked employer-employee data set, estimate a fixed-effects model for workers' wages and interpret the fixed effects as a measure of wage premia. Formally, assume that the natural logarithm of hourly wage rate of worker i in location j, w_{ij}, can be expressed as follows:

$$w_{ij} = X_{ij}\beta + y_j\delta + \alpha_j + u_{ij} \qquad \delta > 0; \tag{3}$$

where X_{ij} is a vector of individual characteristics measuring worker i's human capital, y_j is location j's vacancy rate, α_j is a vector of location-specific fixed effects and u_{ij} is a random term. Following a procedure similar to Hausman and Taylor (1981), first regress w_{ij} on X_{ij}, using the mean-deviation operator, to obtain consistent estimates of β. Second, to get an estimate of δ, estimate the following equation:

$$\hat{w}_j - X_j\, b = y_j\delta + \alpha_j + u_j = y_j\delta + \eta_j \tag{4}$$

---

with posting additional vacancies. The adjusted Tobit model is the full information version of Heckman's (1979) self-selection model.

[18] In the conditional vacancy rate equation, we use the natural logarithm of vacancy rates as the dependent variable. This is done to reduce the skewness in the distribution of positive vacancy rates. When we estimate the vacancy model, we weight the observations as follows: 1) we multiply location-specific weights by location size and, 2) we divide the resulting number by the average of the product of location-specific weights and location size.

[19] Holzer (1994) estimates a variant of the Tobit procedure analyzed by Cragg (1971). As pointed out by Greene (1995:596), "an unresolved issue (with this type of model) is that if the first equation does give the probability of a positive observation (i.e. the probability of having positive vacancies), then the relationship of the disturbance in the latent regression underlying the probit model to that in the truncated regression (i.e. conditional vacancy rate equation) is unclear. It is unlikely that they could be independent. In the Tobit model, the probit disturbance is $1/\sigma$ times that in the truncated regression. In Cragg's model, the relationship is ambiguous."

[20] When making a decision on whether to accept a job offer or not, an applicant considers the wage offer conditional on his/her human capital and on working conditions. Workplaces which offer wage premia are likely to see their wage offers accepted more frequently than other workplaces, leading to relatively low vacancy durations and hence low vacancy rates. Similarly, when making a decision on whether to quit a job or not, a worker will also consider his/her wages conditional on his/her human capital and on working conditions.

where $\eta_j = \alpha_j + u_j$. Our strategy would then be to use the residuals $\acute{\eta}_j$ obtained from equation 4 as a measure of wage premia and insert these in the vacancy model.[21]

Since y_j may be correlated with η_j [1) workplaces with high fixed effects α_j may have low vacancy rates, 2) workplaces with high vacancy rates may raise their wages, increasing u_j] one needs to replace y_j by an instrumental variable. The challenge is to find an instrument which is uncorrelated with η_j. One possibility would be to instrument y_j with the predicted vacancy rates obtained from a reduced form model. The problem with this approach is that the predicted vacancy rates are likely to depend on industry, location size and union status, all of which are likely to affect also α_j.

A simpler alternative is to write a conventional wage equation:

$$w_{ij} = \alpha_0 + X_{ij}\theta_1 + Z_j\theta_2 + y_j\delta + u_{ij} \qquad \delta > 0; \qquad (3')$$

where Z_j is a vector of firm-level explanatory variables (e.g. location size, industry) affecting worker i's wages.[22] Replace y_j by its reduced form, incorporating the vectors Z_{1j} and Z_{2j} [defined in equations (1) and (2)] in equation (3'). Third, assume that wage premia are a function of Z_j and insert these wage premia in the vacancy model.[23]

It becomes clear that identification problems arise if Z_j is a subset of Z_{1j} and z_{2j}. For instance, if location size and industry are explanatory variables in (the reduced form of) the vacancy model—as they should be—and if wage premia are defined as being a linear function of location size and industry only, then the estimated wage premia will be perfectly correlated with location size and industry in the vacancy model. In this case, it will be impossible to estimate the effet of wage premia in the vacancy model.

Essentially, the problem is that we need (at least one) explanatory variable(s) which affect wage premia but does not affect vacancy rates. This is a non-trivial requirement. Because they explain wage differences across comparable workers, efficiency wage models are a natural starting point in our search of determinants of wage premia.

One type of efficiency wage model suggests that turnover costs may be a factor generating wage premia: firms with high turnover costs may pay higher wages to comparable workers in order to reduce turnover costs (Salop, 1979). If so, average training costs per employee—a proxy for turnover costs—could be inserted in Z_j in equation (3'). However, if high training costs lead employers to be more selective when screening candidates (Burdett and Cunningham, 1998:453), causing an increase in vacancy durations, they will affect vacancy rates.

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[21] Since the residuals $\acute{\eta}_j$ measure η_j with error, one could follow Baker and Benjamin (1997) and use the *deciles* of $\acute{\eta}_j$ as a strategy to overcome the measurement error problem.

[22] The estimation of equation (3') requires correcting for grouped-data problems (Moulton, 1986).

[23] If some of the variables included in Z_j are present in Z_{1j} and Z_{2j} (e.g. location size and industry), the estimated wage premia will capture both the effect of θ_2 and δ on workers' wages. The coefficients θ_2 and δ cannot be estimated separately for these variables.

The gift-exchange efficiency wage model of Akerlof (1982) suggests that firms who rely heavily on teamwork may pay higher wages to increase workers' effort. The relative importance of teamwork in a location could then be a source of wage premia.[24] However, teamwork may be a desirable (or undesirable) job characteristic for some workers and may thus affect workers' acceptance rate of job offers, leading to a change in vacancy durations and thus, in vacancy rates.

The shirking model of Shapiro and Stiglitz (1984) shows that employers which have high monitoring costs may also pay higher-than-average wages. One way to proxy monitoring costs could be to measure the percentage of supervisors in a location. Unfortunately, this variable is not available in WES 1999.

Finally, the adverse selection model of Weiss (1980) posits that firms with higher wages will attract better candidates in a context where workers' productivity is unobserved and workers' reservation wages are a signal of their productivity. However, the wage differences which arise in this model result from the fact that workers have different unobserved abilities and, thus, are not truly comparable. Hence, this model does not provide a source of wage premia.

In sum, because of data constraints or conceptual reasons, efficiency wage models cannot be used to identify the vacancy equation.

Rent-sharing models could perhaps be helpful. Firms which experience high profits in period t may increase their wages during this period and thus, profits may be a determinant of wage premia. Since profits are unlikely to determine vacancy rates—unless firms use profits to reduce the vacancy problem—they could potentially be used to identify the vacancy equation. Unfortunately, profits are not reliably measured in WES 1999: inserting them in the wage equation would likely introduce severe measurement error problems.[25]

Market power in the product market, as proxied by the number of competitors, could also influence workers' wages. Monopolistic firms may share part of their extra profits with their workers. Since the number of competitors a location faces is unlikely to affect its vacancy rate, it is a potential candidate to identify the vacancy equation. Unfortunately, it turns out that this variable has no significant effect in the wage equation and, as a result, is not a source of wage premia.

To identify the vacancy equation, we use an indicator for whether or not a location is foreign-controlled.[26] Controlling for workers' characteristics, working in a foreign-controlled wokplace is associated with a wage premium of roughly 7%. Our measure of wage premia is defined as a linear function of location size, a multi-location firm indicator, industry, firm's union status and foreign-control status.[27] Because, the first four variables are, as we shall see below, already explanatory

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[24] One could question this argument by noting that an increase in workers' effort corresponds to a worsening of working conditions and, as such, does not truly generate a wage premium.

[25] Because profits are endogenous with respect to wages (profits equal revenue minus labour costs minus other costs), one would need to instrument them in the wage equation.

[26] The indicator equals 1 if at least 50% of the location's assets are held by foreigners, 0 otherwise.

[27] More precisely, it is the sum of the products of these variables and their estimated coefficients in equation (3').

variables in the vacancy equation, we acknowledge that the identification of the vacancy equation is fairly weak.

IV.2 Model specification

Factors which affect firms' job vacancy rates do so by altering vacancy frequencies and/or vacancy durations. Any factor which increases the flow of new vacancies and/or the durations of vacancies will increase a firm's vacancy rate.[28] We include the following explanatory variables in the reduced form.

1) *Location size*. The size of a workplace can affect vacancy rates through three mechanisms. First, large workplaces may have lower vacancy rates because they have lower vacancy frequencies, due to relatively low turnover rates. Low turnover rates could in turn be due to the fact that: a) large locations pay relatively high wages and offer better pension coverage (Brown et al., 1990), b) have lower permanent layoff rates (Picot, 1992), and c) have an internal labour market which allow workers to change jobs without changing employers.[29] Second, when trying to fill vacancies, large locations may have a larger pool of applicants because they offer a wage premium, high fringe benefits, job security and better career opportunities. A larger pool of applicants is likely to lower vacancy durations and thus to decrease vacancy rates. Third, these two effects could be offset by the possibility that workplaces which pay wage premia may be more selective when evaluating candidates, thereby increasing vacancy durations and vacancy rates (Burdett and Cunningham, 1998:453). Hence, it is unclear, a priori, whether large locations should have lower or higher vacancy rates than their small counterparts.

2) *Multi-location firm indicator*. This variable equals 1 if a workplace is part of a multi-location firm, 0 otherwise. This employer size variable is intended to capture differences in vacancy rates which may arise from: a) the fact that, controlling for location size, large firms pay higher wages (Brown et al., 1990) and b) employees in multi-location firms may change locations without changing employers and, as a result, may enjoy greater career opportunities than other workers.

3) *Union status*. This variable equals 1 if at least one of the employees in a location is unionized, 0 otherwise. Unionized locations may have lower vacancy rates if they offer higher wages (Lewis, 1986), better job security and better working conditions (e.g. a grievance system for employees) than other locations. Alternatively, unionized locations could have higher vacancy rates if, for some reasons, they performed a more thorough screening of applicants than other locations.

4) *Percentage of skilled workers in a location.* This is the percentage of employees who are managers, professionals or technical/trades workers. Locations which have a high percentage of skilled workers are likely to have strong skill requirements for their job openings. This would

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[28] In a steady-state, job vacancy rates, like any stock variable, equal the product of inflow rates (of new vacancies) and average durations (of vacancies).

[29] Picot (1992) documents layoff rates by *firm* size, rather than location size. Morissette et al. (1992) analyze quit rates by *firm* size and find that " Firms with less than 20 employees exhibit quit rates almost twice as high as those of firms with 500 or more employees".

tend to lower the pool of acceptable applicants, increase vacancy durations and increase vacancy rates. The same argument may apply to the next three variables.

5) *Implementation of a new technology increasing skill requirements*. This variable contains two categories. The first refers to locations which have implemented at least one new technology between April 1, 1998 and March 31, 1999, the most costly of which increases skill requirements.[30] The second is for locations which either have adopted at least one new technology, the most costly of which does not increase skill requirements or which have not adopted any new technology between April 1998 and March 1999. Because they are likely to have relatively strong skill requirements the first type of locations is expected to have higher vacancy rates than the second type.

6) *Innovator*. This variable equals 1 if, between April 1, 1998 and March 31, 1999, a location has satisfied one of the following criteria: a) introducing new goods or services, b) introducing new processes, c) improving goods or services, d) improving processes. Otherwise, the variable equals 0. As long as the process of innovation requires highly specialized and up-to-date skills from a location's workforce, one may expect innovators to have fairly strong skill requirements for their vacancies. As explained above, this would increase their vacancy rates.

7) *Locations facing significant international competition*. This variable equals 1 if a location reports that the extent of competition it faces from U.S. firms or other internationally-owned firms is important, very important or crucial, 0 otherwise. If one assumes that competing in an international market requires mastering the most recent and sophisticated technologies, and given the positive correlation between workers' skills and technology use[31], one might expect that locations facing significant international competition will generally require highly-skilled workers when they have job openings. This would increase their vacancy rates.

8) *Local unemployment rate*. This variable is defined as the unemployment rate of males aged 25-54, by economic region. Locations which operate in low-unemployment labour markets generally face a relatively small pool of applicants and consequently have longer vacancy durations and higher vacancy rates.

9) *Industry*. Controls for industry are intended to capture: differences in skill requirements and/or working conditions which may occur across sectors and, wage premia which may arise because of inter-industry wage differentials (Krueger and Summers, 1988).[32]

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[30] By new technology, we mean one of the three following possibilities: 1) implementing a major new software and/or hardware installation, 2) implementing computer-controlled or computer-assisted technology, 3) implementing other technologies or machinery.

[31] Using the 1993 Survey of Innovation and Advanced Technology, Baldwin et al. (1997) show that, among manufacturing plants, the introduction of advanced technologies increases skill requirements more often than it reduces them.

[32] Because of the small sample size of real estate, rental and leasing industries, this sector is grouped with finance and insurance in the estimation.

10) *Human resources unit.* In a given location, the responsibility for human resources matters can: a) be attributed to a separate human resources unit employing more than one person, b) be attributed to one full-time person, c) comprise part of one person's job, such as the owner or manager, d) be attributed to a person or unit in another workplace, e) be attributed in such a way that human resources matters are handled as they arise (i.e. are not assigned to one person in particular), f) be attributed through some other arrangement.[33] We expect locations with a separate human resources unit to have lower vacancy rates than locations in which only one person deals with human resource issues on a full-time or part-time basis. The reason is that human resources units may be able to screen a larger number of applicants during a given time interval, decreasing vacancy durations and vacancy rates.

11) *Foreign-owned locations.* This variable equals 1 if 50% or more of a location's assets are owned by foreigners, 0 otherwise. Controlling for workers' human capital and other firm characteristics, we find with WES 1999 that workers in foreign-owned locations receive higher wages than other workers. Hence, part of the wage premia received by some workers could originate from working in a foreign-owned workplace.[34]

We neither include labour turnover rates nor wage premia in our reduced form. The reasons for doing so are the following. First, quit rates—the major component of labour turnover rates—depend on the wage premium received (Cappelli and Neumark, 2001), as well as on industry, firm size and union status. Since wages are endogenous with respect to vacancy rates, labour turnover rates are also endogenous. Second, wage premia depend on wages and thus are also endogenous.

The effect of wage premia on locations' vacancy rates is unclear. On one hand, workplaces which pay relatively high wages for comparable workers are : a) likely to attract a large pool of applicants for their job openings and have low vacancy durations, b) have low labour turnover rates and hence low vacancy frequencies. On the other hand, as mentioned above, locations which pay wage premia may be more critical when screening job applicants, thereby raising vacancy durations and vacancy rates.

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[33] Because of small sample size, categories b and c are grouped together in the estimation. Categories e and f are also grouped together.

[34] Ideally, variables accounting for the growth of a location's labour demand, such as sales growth or recent employment growth, should be included in the vacancy model: such variables are intended to capture job openings for *new* employees (rather than job openings to replace former employees). We experimented with specifications of the model including one of the two aforementioned variables at a time and found that both had unexpected signs, i.e. higher sales growth or employment growth was associated with lower vacancy rates. Following Holzer (1994), we also included the percentage of university graduates in an economic region as a measure of the supply of highly-skilled workers in a local labour market. Contrary to our expectations, a greater supply of highly-skilled workers was associated with *higher* vacancy rates. Omitting this variable and the two previous variables from the model does not alter any of the qualitative conclusions reached in this paper.

V. *Estimation results*

V.1 Reduced form

We consider two samples: 1) all profit-oriented locations (Model 1) and, 2) profit-oriented locations in which at least one employee has responded to the survey (Model 2).[35] In both cases, the vector of regressors for the probit equation is the same as for the conditional vacancy rate equation, i.e. $Z_{1j} = Z_{2j}$.

In Appendix 1, we present the detailed estimation results. As discussed above, the results contain two sets of coefficients. The first set of coefficients measures the effect of regressors on the probability of having positive vacancies while the second set measures the effect of these regressors on the conditional (natural logarithm of) vacancy rates.

For both samples, the coefficients for location size confirm the previous finding of Table 1, i.e. that the probability of having positive vacancies increases with location size while conditional vacancy rates decrease with location size. As pointed out by Holzer (1994), indivisibilities in individual vacancies may explain the positive association between the probability of having positive vacancies and location size: the greater the number of jobs in a given location, the higher the probability that at least one of them is vacant.

Looking at the sign and statistical significance of coefficients, locations which are innovators, which have adopted a new technology increasing skill requirements or which face significant international competition have a higher probability of having positive vacancies, compared to other workplaces. Interestingly, workplaces with a human resources unit (the reference group) have a higher probability of having positive vacancies than those in which only one person deals with human resource issues on a full-time or part-time basis. Employers who are operating in slack local labour markets are less likely to have vacancies than others. Unionized workplaces are less likely to have vacancies than others but the effect is not significant at conventional levels.

Locations which are unionized, foreign-owned, part of a multi-location firm as well as those in high-unemployment local labour markets, have lower conditional vacancy rates than other firms. As expected, workplaces which have a high percentage of skilled workers or which have adopted a new technology increasing skill requirements have higher conditional vacancy rates than others. Innovation has no (statistically) significant effect on locations' conditional vacancy rates while the impact of international competition is significant in Model 2 (at the 10% level) but not in Model 1.

While the coefficients of the probit model and of the conditional vacancy rate equation provide useful information on the direction of the effects, they tell nothing about the magnitude of these effects. More precisely, they cannot be used to infer what the expected vacancy rate is for a given location.

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[35] The restriction imposed on the latter sample ensures that equation (3') can be estimated for all selected locations.

To answer this question, we need to calculate the expected (unconditional) vacancy rates.[36] Table 4 presents these expected vacancy rates for various firm characteristics.[37]

The first thing to note is that, as expected, locations which presumably have strong skill requirements have higher-than-average vacancy rates. This is the case for locations which are innovators, which have adopted a new technology increasing skill requirements, which have a high percentage of skilled workers, or which face significant international competition. However, some of these effects are fairly small. For instance, expected vacancy rates equal 1.8%-1.9% when the percentage of skilled workers equals 10% and increase slightly to 2.1%-2.2% when the percentage of skilled workers amounts to 50%.

Similarly, locations which are non-unionized, not part of a multi-location firm or which operate in communication and other utilities, retail trade and consumer services and business services also exhibit relatively high vacancy rates.

Unsurprisingly, workplaces operating in tight local labour markets face more severe labour shortages than others. For instance, expected vacancy rates equal 2.1%-2.2% when local unemployment rates equal 6% but amount to only 0.8%-0.9% when local unemployment rates are 20%. Foreign-held locations display somewhat smaller vacancy rates than other locations.

Contrary to our expectations, workplaces with a human resources unit employing more than one person have higher vacancy rates (2.7%-2.9%) than those in which only one person deals with human resource issues on a full-time or part-time basis (1.8%-2.0%). Our explanation is that the presence of a human resource unit in a location may be a proxy for *bureaucracy*: such locations may have detailed and lengthy procedures throughout the screening process, take more time to process applications and thus have longer vacancy durations and higher vacancy rates.

One surprising result from Models 1 and 2 is the fact that vacancy rates in small locations (10 employees) are very similar to those in large locations (500 employees). In both models, the difference between equals only 0.2 percentage points, small locations having slightly higher vacancy rates than the large ones. To check the robustness of this finding, we proceed in two steps. First, we use location size and its squared along with the multi-location indicator as the only regressors in the model [Model 3 (N = 5,398) and Model 4 (N = 4,918)]. In this case, vacancy rates are marginally *higher* (by 0.1 percentage point) in small firms. Second, we use only location size and the multi-location indicator as a regressor [Model 5 (N = 5,398) and Model 6 (N = 4,918)]. Both steps are used to give location size the greatest chances of having a non-trivial empirical effect on vacancy rates. In the second case, the difference between small and large locations equals 0.3 percentage points. Taken together, these results confirm the finding that vacancy rates in small workplaces are very similar to those of large workplaces.

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[36] Because the dependent variable in the conditional vacancy rate equation is the natural logarithm of the vacancy rate, we need to calculate the expected value for the untransformed outcome. This is done using the following formula: $E(y) = \Psi(Z_1*\beta_1 + \rho\sigma) * \exp(Z_2*\beta_2 + \sigma^2/2) *$ where y is the vacancy rate and the other variables are defined above by equations (1) and (2) (see Manning et al., 1987: 62).

[37] The calculations are done conditional on the average values of the explanatory variables.

This finding comes as a surprise since large workplaces: a) have an internal labour market allowing workers to change jobs without changing employers, b) have lower layoff rates and c) offer high wages and high fringe benefits. From the employee point of view, all these factors are expected to make jobs in large workplaces more attractive. They should both decrease quit rates and increase workers' acceptance rate of job offers, thereby reducing vacancy frequencies, vacancy durations and thus vacancy rates. However, as mentioned above, because they pay relatively high wages, large employers may spend more time evaluating job applicants and, as a result, have longer vacancy durations. This may explain why expected vacancy rates in small locations do not differ substantially from those in large locations.

Our results do suggest, however, that locations belonging to larger organizations (i.e. multi-location firms) have lower vacancy rates than others. Three explanations can be put forward for this pattern: 1) large firms may have better information about the labour market and be more successful in filling vacancies quickly, 2) because they pay higher wages, large firms may have relatively low quit rates and low vacancy durations and, 3) large firms have a bigger internal labour market than other firms.

To get a better idea of the variability of locations' vacancy rates across different sectors of the economy, it is worth looking at the expected vacancy rates associated with various configurations of location characteristics. We go back to Models 1 and 2 and consider two configurations: 1) locations which innovate, which have introduced new technologies increasing skill requirements and whose percentage of skilled workers is one standard deviation above average, 2) non-unionized locations operating in retail trade and not belonging to a multi-location firm. For the first group of locations, expected vacancy rates equal 3.2%-3.3%. For the second group, they amount to 4.3%-5.1%.

V.2 Including wage premia in the vacancy model

In this case, the vector of regressors includes a wage premium variable and excludes the foreign ownership indicator (Appendix 1, Model 7, N=4,918). Most of the qualitative conclusions obtained from the reduced form remain unchanged (Table 4, Model 7).[38] The expected vacancy rates show no distinct pattern across deciles of the wage premium distribution. This may be due to the high correlation between our measure of wage premium and industry, location size and union status.[39]

VI. Conclusion

The main finding of this paper is plausible—locations with high vacancy rates consist of at least two types—those with fairly high skill requirements and those in high turnover, low-paid, non-unionized sectors such as retail trade and consumer services industries.

For some firms, having vacancies may be profit-maximizing. The monopsonist case analyzed in Gunderson and Riddell (1993:264) is a clear example. More generally, in workplaces where costs of training—and thus costs of labour turnover—are low, high vacancy rates may result from an

[38] The only qualitative change observed is that the expected vacancy rates of some industries change slightly.

[39] The fact that the expected vacancy rates across deciles of the wage premium distribution change substantially when we add location size squared is indicative of a multicollinearity problem.

optimal strategy which includes paying relatively low wages. There may be a trade-off between paying high wages (thereby reducing vacancies to zero) and having positive vacancy rates.[40] In other terms, some firms may find it profitable to choose a low-wage/high vacancy rate strategy. Search models like Mortensen (1998) generate equilibrium number of vacancies and wage(s) offer(s) (distributions).

If high vacancy rates are profit-maximizing in sector A but are higher than desired in sector B, then one should observe higher increases in the wages of new entrants in sector B than in sector A (controlling for the growth in product demand of each sector). One way to test this would be to use longitudinal data on locations and examine the change over time in wages of new entrants in these locations.

The fact retail trade and consumer services industries have high vacancy rates would be of no interest if this sector had a negligible importance in the private sector. This is clearly not the case. This industry accounts for 30% of all jobs (filled and unfilled), for more than 40% of all job vacancies and for 50% of long-term vacancies. This simple fact implies that a substantial share of job openings are outside the high-technology sectors.

[40] In the short run, paying higher wages to new entrants may be sufficient to solve the vacancy problem. In the longer run, however, a location may have to increase wages of high-seniority workers to maintain morale and productivity.

Table 1: Job vacancy rates by location characteristics - all profit-oriented locations (N=5,398), 1999.

	(1) % of locations with vacancies	(2) % of jobs in locations with vacancies	(3) Conditional vacancy rate (%)	(4) Unconditional vacancy rate (%)	(5) Percentage distribution of locations	(6) Percentage distribution of jobs	(7) Percentage distribution of vacancies
Overall	12.8	35.0	7 8	2.7	100.0	100.0	100.0
Location size							
less than 20 employees	10.0	17.7	15.8	2.8	87.2	36.9	37.8
20 to 99	29.5	33.1	10.0	3.3	11.3	33.9	40.6
100 to 499	50.5	55.3	3.8	2.1	1.3	18.6	14.3
500 or more	66.6	65.2	2.9	1.9	0.1	10.6	7.3
Part of a multi-location firm ?							
No	12.3	30.7	10.6	3.3	82.8	62.7	25.1
Yes	14.9	42.1	4.4	1.9	17.2	37.3	74.9
Innovation							
No	7.0	24.1	8.1	2.0	51.1	34.6	24.5
Yes	18.8	40.8	7.8	3.0	48.9	65.4	75.5
Adopting new technology increasing skill requirements							
No	10.7	31.2	8.4	2.6	84.3	74.7	71.1
Yes	25.0	46.0	6.8	3.1	14.7	25.3	28.9
Union							
No	12.3	31.8	9.7	3.1	92.8	73.4	82.2
Yes	19.1	43.6	4.2	1.8	7.2	26.6	17.8
Competition in most important product market							
No competitors	8.0	29.2	7.8	2.3	16.6	11.2	9.2
1 - 5	12.8	37.5	8.4	3.2	30.6	30.9	35.6
6 - 20	11.9	35.5	7.1	2.5	26.1	29.9	27.5
20 or more	16.6	33.9	8.0	2.7	26.7	28.0	27.7

Table 1: Job vacancy rates by location characteristics - all profit-oriented locations (N=5,398), 1999.

	(1) % of locations with vacancies	(2) % of jobs in locations with vacancies	(3) Conditional vacancy rate (%)	(4) Unconditional vacancy rate (%)	(5) Percentage distribution of locations	(6) Percentage distribution of jobs	(7) Percentage distribution of vacancies
Percentage of skilled workers*							
10% - 29%	14.8	34.4	6.4	2.2	23.0	35.4	28.3
30% - 39%	9.4	34.0	5.5	1.9	8.1	9.9	6.8
40% and above	14.9	36.9	7.5	2.8	41.0	33.7	34.1
Flexible organizational practices*							
no	9.2	21.7	13.7	3.0	84.6	45.4	49.1
yes	32.3	46.0	5.5	2.6	15.4	54.6	50.9
Grievance System							
no	8.3	25.2	13.5	3.4	52.2	29.1	23.7
informal	17.1	32.7	9.2	3.0	38.3	37.0	40.3
formal	20.2	45.8	4.2	1.9	9.5	33.9	36.0
Profit Sharing							
no	11.8	34.0	8.1	2.8	91.6	82.6	82.8
yes	23.5	39.7	6.9	2.7	8.4	17.4	17.2
Who deals with human resources matters?							
human resources unit in location	31.7	61.4	3.9	2.4	2.8	21.3	18.6
1 person full-time or part-time in location	12.2	29.1	10.2	3.0	62.8	50.9	55.2
person/unit outside location	10.7	21.6	8.1	1.8	5.7	5.0	3.2
other arrangement	12.7	26.4	10.5	2.8	28.7	22.8	23.1
Information and communication technology sector?*							
No	12.7	34.1	8.0	2.7	96.8	95.3	95.0
Yes	15.4	52.3	5.6	2.9	3.2	4.7	5.0

Table 1: Job vacancy rates by location characteristics - all profit-oriented locations (N=5,398), 1999.

	(1) % of locations with vacancies	(2) % of jobs in locations with vacancies	(3) Conditional vacancy rate (%)	(4) Unconditional vacancy rate (%)	(5) Percentage distribution of locations	(6) Percentage distribution of jobs	(7) Percentage distribution of vacancies
Industry							
Forestry, mining oil and gas extraction	6.2	20.5	4.0	0.8	2.0	2.1	0.7
Labour intensive tertiary manufacturing	19.2	43.0	5.8	2.5	3.2	6.0	5.4
Primary product manufacturing	25.2	38.1	3.4	1.3	1.1	4.5	2.0
Secondary product manufacturing	18.8	49.6	4.6	2.3	1.8	4.3	3.5
Capital intensive tertiary manufacturing	25.3	51.7	4.2	2.2	2.5	6.8	5.4
Construction	10.8	22.1	10.9	2.4	8.0	4.6	3.9
Transportation, warehousing, wholesale trade	13.9	30.3	7.6	2.3	12.8	13.0	10.7
Communication and other utilities	10.5	42.3	5.2	2.2	1.2	1.8	1.4
Retail trade and consumer services	13.2	31.1	12.6	3.9	36.7	30.1	43.2
Finance and insurance	13.8	33.8	6.3	2.1	5.0	5.6	4.3
Real estate, rental and leasing operations	-	-	-	-	3.3	2.2	3.4
Business services	13.0	35.0	7.2	2.5	12.0	10.7	10.5
Education and health services	5.7	35.0	4.7	1.6	8.6	5.4	3.3
Information and cultural industries	18.2	52.9	4.7	2.5	1.6	3.0	2.3
Local unemployment rate							
4% - 5%	15.1	38.2	8.6	3.3	50.2	53.6	64.2
6% - 7%	10.6	30.8	6.5	2.0	25.4	22.9	16.8
8% or above	8.4	29.7	6.5	1.9	18.7	17.8	12.5
Location facing significant international competition?							
No	11.0	26.4	10.8	2.9	80.9	60.2	62.5
Yes	20.3	47.9	5.4	2.5	19.1	39.8	37.5
Turnover Rate*							
less than 5%	6.1	24.3	5.3	1.3	54.5	38.8	18.2
5% - 9%	28.8	45.1	4.7	2.1	4.0	13.0	10.1
10 - 14%	20.1	38.9	5.4	2.1	6.5	12.3	9.4
15 - 19%	35.5	46.6	10.3	4.8	3.9	6.6	11.5
20% or more	18.1	40.4	11.8	4.8	31.2	29.3	50.8

Table 1: Job vacancy rates by location characteristics - all profit-oriented locations (N=5,398), 1999.

	(1) % of locations with vacancies	(2) % of jobs in locations with vacancies	(3) Conditional vacancy rate (%)	(4) Unconditional vacancy rate (%)	(5) Percentage distribution of locations	(6) Percentage distribution of jobs	(7) Percentage distribution of vacancies
Location provides training?							
No	4.4	10.7	11.3	1.2	46.6	19.4	8.5
Yes	20.1	40.8	7.6	3.1	53.4	80.6	91.5
Average compensation*							
Lowest 10%	9.7	33.8	20.8	7.1	10.1	7.9	20.3
2nd decile	13.8	34.1	8.5	2.9	9.9	7.2	7.6
3rd decile	20.2	42.6	8.7	3.7	9.8	8.4	11.3
4th decile	13.0	29.7	9.1	2.7	10.2	7.1	7.0
5th decile	11.2	21.8	9.9	2.2	10.1	7.5	5.9
6th decile	6.6	25.6	5.3	1.4	10.4	9.3	4.6
7th decile	13.6	37.4	7.2	2.7	9.9	8.7	8.5
8th decile	9.9	32.9	7.3	2.4	9.6	11.7	10.1
9th decile	14.2	37.2	6.6	2.5	9.5	10.2	9.2
highest 10%	16.0	42.1	4.6	1.9	10.6	22.0	15.5
Region							
Atlantic provinces	5.8	17.1	8.5	1.5	8.9	6.3	3.3
Quebec	12.2	35.5	6.1	2.2	20.6	22.9	17.9
Ontario	16.3	40.7	8.6	3.5	38.0	41.4	52.6
Prairies	10.5	27.8	7.0	1.9	7.3	6.4	4.5
Alberta	14.6	37.3	9.8	3.7	11.3	10.8	14.4
British Columbia	8.2	25.7	6.3	1.6	14.0	12.2	7.2
Innovator, adopting new technology increasing skill requirements and with more than 37.6% of skilled workers							
no	12.1	34.1	7.8	2.7	94.8	93.7	91.0
yes	8.8	47.4	8.2	3.9	5.9	6.3	9.0
Non-unionized location in retail trade and not belonging to a multi-location firm							
no	8.4	35.8	6.2	2.2	73.0	82.9	66.6
yes	14.9	31.2	17.1	5.3	27.0	17.1	33.4

Source : Workplace and Employee Survey of 1999.

*- See text for definitions.

1. Applies only to establishments with more than 10 employees.

Table 2 : Job vacancy rates by industry, all vacancies and long-term vacancies.*

Industry	Job vacancy rates		Percentage distribution of	
	(1) All vacancies	(2) Long-term vacancies	(3) All vacancies	(4) Long-term vacancies
	%	%	%	%
Forestry, mining oil and gas extraction	0.8	-	0.6	0.5
Labour intensive tertiary manufacturing	2.5	1.3	5.5	6.2
Primary product manufacturing	1.3	0.5	2.1	1.7
Secondary product manufacturing	2.3	0.8	3.6	2.6
Capital intensive tertiary manufacturing	2.2	1.0	5.4	5.5
Construction	2.4	1.7	4.0	6.1
Transportation, warehousing, wholesale trade	2.3	0.7	10.9	6.6
Communication and other utilities	2.2	0.9	1.4	1.3
Retail trade and consumer services	3.9	-	43.1	50.3
Finance and insurance	2.1	0.8	4.3	3.6
Real estate, rental and leasing operations	-	-	3.3	5.7
Business services	2.5	0.7	9.8	6.2
Education and health services	1.6	0.7	3.2	2.8
Information and cultural industries	2.5	0.4	2.8	0.9
Total	2.7	1.3	100.0	100.0

Source : Workplace and Employee Survey of 1999.
* : long-term vacancies = vacancies lasting 4 months or more.
The sample consists of 5,398 profit-oriented locations.
- : numbers not reliable.

Table 3 : Percentage of workers for whom vacant positions are usually filled from outside the company..

	Profit-oriented locations	Profit-oriented locations with unfilled vacancies
	%	%
All industries	78.0	78.5
All industries except retail trade and consumer services	77.3	77.0
Forestry, mining oil and gas extraction	75.6	71.9
Labour intensive tertiary manufacturing	89.2	88.1
Primary product manufacturing	72.3	79.8
Secondary product manufacturing	80.6	75.7
Capital intensive tertiary manufacturing	80.9	81.0
Construction	88.0	89.3
Transportation, warehousing, wholesale trade	73.7	77.9
Communication and other utilities	60.7	51.4
Retail trade and consumer services	79.6	83.1
Finance and insurance	62.2	62.2
Real estate, rental and leasing operations	89.5	88.1
Business services	82.6	78.5
Education and health services	69.7	64.7
Information and cultural industries	72.5	78.8

Source : Workplace and Employee Survey of 1999.

Table 4 : Expected vacancy rates (%) resulting from adjusted Tobit models.

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5	(6) Model 6	(7) Model 7
Overall	2.1	2.0	2.9	2.7	2.9	2.7	2.1
Location size							
10 employees	2.2	2.1	2.9	2.7	3.0	2.8	2.1
50	2.2	2.1	2.9	2.7	3.0	2.7	2.1
100	2.1	2.0	2.9	2.7	2.9	2.7	2.1
500	2.0	1.9	3.0	2.8	2.7	2.5	1.9
Part of a multi-location firm?							
No	2.5	2.3	3.5	3.1	3.4	3.0	2.3
Yes	1.6	1.6	2.2	2.1	2.2	2.2	1.8
Innovation							
No	1.7	1.7	-	-	-	-	1.8
Yes	2.5	2.3	-	-	-	-	2.3
Adopting new technology increasing skill requirements							
No	2.0	1.9	-	-	-	-	1.9
Yes	2.6	2.6	-	-	-	-	2.6
Percentage of skilled workers							
10%	1.9	1.8	-	-	-	-	1.9
30%	2.1	2.0	-	-	-	-	2.0
40%	2.2	2.0	-	-	-	-	2.1
50%	2.2	2.1	-	-	-	-	2.2
Location facing significant international competition?							
No	1.9	1.7	-	-	-	-	1.8
Yes	2.5	2.6	-	-	-	-	2.6
Union							
No	2.4	2.2	-	-	-	-	2.4
Yes	1.6	1.5	-	-	-	-	1.4
Industry							
Forestry, mining oil and gas extraction	0.6	0.7	-	-	-	-	0.7
Labour intensive tertiary manufacturing	2.3	2.3	-	-	-	-	3.0
Primary product manufacturing	0.8	0.7	-	-	-	-	0.7
Secondary product manufacturing	2.0	2.0	-	-	-	-	2.0
Capital intensive tertiary manufacturing	1.6	1.7	-	-	-	-	1.8
Construction	1.8	1.8	-	-	-	-	1.7
Transportation, warehousing, wholesale trade	2.5	2.6	-	-	-	-	2.7
Communication and other utilities	3.9	3.2	-	-	-	-	2.9
Retail trade and consumer services	4.0	3.5	-	-	-	-	4.5
Finance, insurance, real estate, rental, and leasing	2.7	2.3	-	-	-	-	1.9
Business services	3.2	3.1	-	-	-	-	3.5
Education and health services	1.6	1.7	-	-	-	-	1.9
Information and cultural industries	2.8	2.8	-	-	-	-	2.8

Source : Authors' calculations from the Workplace and Employee Survey of 1999.

Table 4 : Expected vacancy rates (%) resulting from adjusted Tobit vacancy models.

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5	(6) Model 6	(7) Model 7
Foreign-held location							
No	2.2	2.1	-	-	-	-	-
Yes	1.9	1.8	-	-	-	-	-
Who deals with human resources matters?							
human resources unit in location	2.9	2.7	-	-	-	-	2.7
1 person full- or part-time in location	2.0	1.8	-	-	-	-	1.9
person/unit outside location	2.0	2.1	-	-	-	-	2.1
Local unemployment rate							
2%	2.8	2.7	-	-	-	-	2.7
4%	2.5	2.4	-	-	-	-	2.4
6%	2.2	2.1	-	-	-	-	2.2
8%	2.0	1.9	-	-	-	-	1.9
10%	1.8	1.7	-	-	-	-	1.7
20%	0.9	0.8	-	-	-	-	0.9
Wage premium							
bottom decile	-	-	-	-	-	-	2.0
2nd decile	-	-	-	-	-	-	1.2
3rd decile	-	-	-	-	-	-	1.4
4th decile	-	-	-	-	-	-	2.3
5th decile	-	-	-	-	-	-	1.9
6th decile	-	-	-	-	-	-	2.1
7th decile	-	-	-	-	-	-	3.3
8th decile	-	-	-	-	-	-	2.7
9th decile	-	-	-	-	-	-	2.0
top decile	-	-	-	-	-	-	2.2
Innovator, adopting new technology increasing skill requirements and with % of skilled workers 1 standard deviation above average	3.3	3.2	-	-	-	-	3.2
Non-unionized locations in retail trade and not belonging to a multi-location firm	5.1	4.3	-	-	-	-	5.7

Source : Authors' calculations from the Workplace and Employee Survey of 1999.
- See text for definition of models.

Appendix 1: Definition of variables.

ttl_emp: number of employees in a location.

innovat1: equals 1 if a location has introduced a new product/new process of production or has improved products /processes of production in the past year, 0 otherwise.

skl_hgh: equals 1 if a location has introduced a new technology in the past year, the most costly of which increases skill requirements, 0 otherwise.

unioned: equals 1 if at least 1 employee of the location is unionized, 0 otherwise.

skl_pct: percentage of managers, professionals or technical workers in a location.

hr_unit (reference group): a location has a separate human resources unit employing more than one person.
hr_1per: equals 1 if a location has 1 full-time person responsible for human resources matters or if human resources matters in the location comprise part of one person's job, such as the owner or manager, 0 otherwise.
hr_oth: equals 1 if human resources matters in the location are the responsibility of a person or unit in another location, 0 otherwise.
hr_unk: equals 1 if human resources matters in the location are handled as they arise (i.e. are not assigned to one person in particular) or if there is some other arrangement, 0 otherwise.

retail (reference group) 1 for retail trade and consumer services
forest: 1 for forestry or mining
mnufct3l: 1 for tertiary labour intensive manufacturing
mnufct1: 1 for primary manufacturing
mnufct2: 1 for secondary manufacturing
mnufct3k: 1 for tertiary capital intensive manufacturing
constrct: 1 for construction
trnspsw: 1 for transportation, storage, wholesale trade
comu_ou: 1 for communication and other utilities
fin_est: 1 for finance and insurance, real estate, rental, and leasing operations
bzsrvce: 1 for business services
ed_hlth: 1 for education and health care
inf_cult: 1 for information and cultural industries

urate: unemployment rate of males 25-54 by economic region, in 1999
cmp_int1: equals 1 if international competition is important, very important or crucial for a location, 0 otherwise.
foreign: equals 1 if at least 50% of a location's assets are held abroad, 0 otherwise.
single_i: equals 1 if a location is not part of a mult-location firm, 0 otherwise.

APPENDIX 1: REGRESSION RESULTS

MODEL 1: REDUCED FORM OF ADJUSTED TOBIT MODEL
SAMPLE DEFINITION: ALL PROFIT-ORIENTED LOCATIONS
SAMPLE SIZE: 5,398
Log likelihood = -5565.3853

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
PROBABILITY OF HAVING POSITIVE VACANCIES: PROBIT EQUATION						
ttl_emp	.000095	.0000271	3.508	0.000	.0000419	.0001481
innovat1	.3328339	.0413606	8.047	0.000	.2517686	.4138991
skl_hgh	.2087437	.043156	4.837	0.000	.1241595	.2933279
unioned	-.0234331	.0471686	-0.497	0.619	-.1158819	.0690157
skl_pct	.0153857	.0685184	0.225	0.822	-.118908	.1496793
hr_lper	-.6053612	.055963	-10.817	0.000	-.7150466	-.4956758
hr_oth	-.7434723	.0622399	-11.945	0.000	-.8654602	-.6214843
hr_unk	-.8739746	.1085525	-8.051	0.000	-1.086734	-.6612157
forest	-.5125083	.1425902	-3.594	0.000	-.79198	-.2330367
mnufct31	.1317139	.0825648	1.595	0.111	-.0301101	.293538
mnufct1	-.2440426	.0965053	-2.529	0.011	-.4331896	-.0548956
mnufct2	.0212658	.0949729	0.224	0.823	-.1648777	.2074093
mnufct3k	-.0697743	.0824029	-0.847	0.397	-.2312811	.0917325
constrct	-.1702332	.1046481	-1.627	0.104	-.3753396	.0348733
trnspsw	-.2077708	.063898	-3.252	0.001	-.3330085	-.082533
comu_ou	.2102215	.1407405	1.494	0.135	-.0656249	.4860679
fin_est	-.1579441	.0768981	-2.054	0.040	-.3086617	-.0072265
bzsrvce	.1743836	.0884939	1.971	0.049	.0009388	.3478284
ed_hlth	.068782	.0902356	0.762	0.446	-.1080765	.2456404
inf_cult	.2810989	.1148286	2.448	0.014	.056039	.5061588
urate	-3.465064	.7287508	-4.755	0.000	-4.89339	-2.036739
cmp_int1	.3488942	.0428547	8.141	0.000	.2649006	.4328878
foreign	.0086534	.0659452	0.131	0.896	-.1205968	.1379036
single_i	-.0270765	.0414321	-0.654	0.513	-.1082819	.0541289
_cons	-.0542707	.0892876	-0.608	0.543	-.2292713	.1207298

APPENDIX 1: REGRESSION RESULTS

MODEL 1: REDUCED FORM OF ADJUSTED TOBIT MODEL
SAMPLE DEFINITION : ALL PROFIT-ORIENTED LOCATIONS
SAMPLE SIZE: 5,398
Log likelihood = -5565.3853

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
CONDITIONAL VACANCY RATE EQUATION:						
ttl_emp	-.000239	.0000312	-7.667	0.000	-.0003001	-.0001779
innovat1	.0815917	.0644777	1.265	0.206	-.0447824	.2079657
skl_hgh	.1126063	.051946	2.168	0.030	.0107939	.2144186
unioned	-.3576539	.0548993	-6.515	0.000	-.4652546	-.2500532
skl_pct	.3672674	.0865392	4.244	0.000	.1976537	.5368811
hr_lper	-.0106427	.0855778	-0.124	0.901	-.1783722	.1570867
hr_oth	.1242141	.100967	1.230	0.219	-.0736776	.3221057
hr_unk	-.4343487	.1643494	-2.643	0.008	-.7564677	-.1122298
forest	-1.369617	.1965534	-6.968	0.000	-1.754855	-.9843796
mnufct31	-.6171373	.093832	-6.577	0.000	-.8010446	-.43323
mnufct1	-1.352229	.1182279	-11.437	0.000	-1.583951	-1.120506
mnufct2	-.7205559	.1037289	-6.947	0.000	-.9238609	-.5172509
mnufct3k	-.8546606	.0928845	-9.201	0.000	-1.036711	-.6726103
constrct	-.6438602	.1459122	-4.413	0.000	-.9298429	-.3578774
trnspsw	-.300618	.0845709	-3.555	0.000	-.4663739	-.1348622
comu_ou	-.1664862	.1619843	-1.028	0.304	-.4839695	.1509972
fin_est	-.266393	.0991494	-2.687	0.007	-.4607223	-.0720636
bzsrvce	-.3419224	.1093095	-3.128	0.002	-.5561651	-.1276798
ed_hlth	-.9779933	.1124617	-8.696	0.000	-1.198414	-.7575724
inf_cult	-.5382752	.1291126	-4.169	0.000	-.7913312	-.2852192
urate	-3.20657	1.015117	-3.159	0.002	-5.196162	-1.216977
cmp_int1	.0113629	.0646078	0.176	0.860	-.1152661	.1379919
foreign	-.1424173	.0695538	-2.048	0.041	-.2787402	-.0060944
single_i	.4422891	.0506252	8.737	0.000	.3430655	.5415127
_cons	-3.293306	.1672679	-19.689	0.000	-3.621145	-2.965467
sigma						
_cons	1.012008	.0626244	16.160	0.000	.8892664	1.134749
eq4						
_cons	.5918362	.1157028	5.115	0.000	.3650629	.8186096

APPENDIX 1: REGRESSION RESULTS

MODEL 2: REDUCED FORM OF ADJUSTED TOBIT MODEL
SAMPLE DEFINITION: PROFIT-ORIENTED LOCATIONS IN WHICH AT LEAST 1 EMPLOYEE HAS RESPONDED TO THE SURVEY
SAMPLE SIZE: 4,918
Log likelihood = -4991.1968

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
PROBABILITY OF HAVING POSITIVE VACANCIES: PROBIT EQUATION						
ttl_emp	.0000816	.000028	2.917	0.004	.0000268	.0001364
innovat1	.2921378	.0436114	6.699	0.000	.2066611	.3776145
skl_hgh	.2406211	.0452309	5.320	0.000	.1519701	.3292721
unioned	-.0038453	.0491396	-0.078	0.938	-.1001572	.0924666
skl_pct	.0197907	.0711957	0.278	0.781	-.1197504	.1593318
hr_1per	-.6225361	.0584547	-10.650	0.000	-.7371051	-.5079671
hr_oth	-.7009277	.064584	-10.853	0.000	-.82751	-.5743454
hr_unk	-.8104268	.1129283	-7.176	0.000	-1.031762	-.5890914
forest	-.4788848	.1517203	-3.156	0.002	-.7762511	-.1815185
mnufct31	.1719957	.0862422	1.994	0.046	.0029641	.3410273
mnufct1	-.287548	.1030932	-2.789	0.005	-.489607	-.0854891
mnufct2	.0508134	.0972592	0.522	0.601	-.1398112	.241438
mnufct3k	.0594084	.0864162	0.687	0.492	-.1099642	.2287809
constrct	-.1389425	.1094051	-1.270	0.204	-.3533726	.0754876
trnspsw	-.1638634	.0671362	-2.441	0.015	-.2954479	-.0322788
comu_ou	.1005518	.1527117	0.658	0.510	-.1987577	.3998612
fin_est	-.1438071	.0846364	-1.699	0.089	-.3096913	.0220771
bzsrvce	.1975338	.095655	2.065	0.039	.0100533	.3850142
ed_hlth	.1453674	.092795	1.567	0.117	-.0365074	.3272423
inf_cult	.3110509	.1172441	2.653	0.008	.0812567	.5408451
urate	-3.431512	.7602372	-4.514	0.000	-4.92155	-1.941475
cmp_int1	.3707803	.0451457	8.213	0.000	.2822962	.4592643
foreign	.0223332	.0678731	0.329	0.742	-.1106956	.155362
single_i	-.0562831	.0439645	-1.280	0.200	-.1424519	.0298857
_cons	-.0692045	.0938067	-0.738	0.461	-.2530622	.1146533

APPENDIX 1: REGRESSION RESULTS

MODEL 2: REDUCED FORM OF ADJUSTED TOBIT MODEL
SAMPLE DEFINITION: PROFIT-ORIENTED LOCATIONS IN WHICH AT LEAST 1 EMPLOYEE HAS RESPONDED TO THE SURVEY
SAMPLE SIZE: 4,918
Log likelihood = -4991.1968

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
CONDITIONAL VACANCY RATE EQUATION:						
ttl_emp	-.0002505	.0000308	-8.141	0.000	-.0003109	-.0001902
innovat1	.0416028	.0613492	0.678	0.498	-.0786394	.161845
skl_hgh	.1436086	.0524884	2.736	0.006	.0407333	.246484
unioned	-.3634456	.0552046	-6.584	0.000	-.4716445	-.2552466
skl_pct	.366737	.0872118	4.205	0.000	.1958051	.5376689
hr_lper	.0073855	.0820907	0.090	0.928	-.1535094	.1682804
hr_oth	.2102148	.0926881	2.268	0.023	.0285495	.3918801
hr_unk	-.3291993	.1552398	-2.121	0.034	-.6334638	-.0249349
forest	-1.247723	.1981002	-6.298	0.000	-1.635992	-.8594534
mnufct31	-.5319093	.0947374	-5.615	0.000	-.7175912	-.3462274
mnufct1	-1.312746	.1233945	-10.639	0.000	-1.554595	-1.070898
mnufct2	-.5995306	.1031313	-5.813	0.000	-.8016643	-.397397
mnufct3k	-.7371924	.0927288	-7.950	0.000	-.9189375	-.5554474
constrct	-.5736454	.1473833	-3.892	0.000	-.8625114	-.2847795
trnspsw	-.1731924	.0840748	-2.060	0.039	-.337976	-.0084087
comu_ou	-.1528701	.173065	-0.883	0.377	-.4920713	.186331
fin_est	-.3174703	.104869	-3.027	0.002	-.5230097	-.1119309
bzsrvce	-.2363581	.1146785	-2.061	0.039	-.4611239	-.0115923
ed_hlth	-.8411216	.1114185	-7.549	0.000	-1.059498	-.6227453
inf_cult	-.4072672	.1275314	-3.193	0.001	-.6572242	-.1573102
urate	-3.648565	.9957318	-3.664	0.000	-5.600164	-1.696967
cmp_int1	.1148845	.0641125	1.792	0.073	-.0107737	.2405426
foreign	-.1766486	.0690496	-2.558	0.011	-.3119834	-.0413137
single_i	.3784996	.0515097	7.348	0.000	.2775424	.4794568
_cons	-3.373435	.1581349	-21.333	0.000	-3.683373	-3.063496
sigma						
_cons	.985691	.0569922	17.295	0.000	.8739884	1.097394
eq4						
_cons	.6106287	.1020073	5.986	0.000	.4106981	.8105592

APPENDIX 1: REGRESSION RESULTS

MODEL 7: ADJUSTED TOBIT MODEL WITH WAGE PREMIUM
SAMPLE DEFINITION: PROFIT-ORIENTED LOCATIONS IN WHICH AT LEAST 1 EMPLOYEE HAS RESPONDED TO THE SURVEY
SAMPLE SIZE: 4,918
Log likelihood = -4928.5591

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
PROBABILITY OF HAVING POSITIVE VACANCIES: PROBIT EQUATION						
cnt11	.0523521	.1352766	0.387	0.699	-.2127853	.3174894
cnt12	-.5358794	.1497033	-3.580	0.000	-.8292925	-.2424663
cnt13	-.2305061	.1450754	-1.589	0.112	-.5148486	.0538365
cnt14	.1852405	.1406702	1.317	0.188	-.0904681	.4609491
cnt15	-.1952172	.1445276	-1.351	0.177	-.4784861	.0880517
cnt16	.1432835	.1571317	0.912	0.362	-.164689	.451256
cnt17	.1283259	.1398087	0.918	0.359	-.1456941	.4023458
cnt18	.2904392	.1312139	2.213	0.027	.0332647	.5476138
cnt19	.2225163	.1237719	1.798	0.072	-.0200723	.4651048
ttl_emp	.0001276	.0000292	4.363	0.000	.0000703	.0001849
innovat1	.2666396	.0442489	6.026	0.000	.1799134	.3533658
skl_hgh	.2519706	.0456812	5.516	0.000	.1624371	.341504
unioned	-.2077816	.0586753	-3.541	0.000	-.3227831	-.0927801
skl_pct	.0600791	.0720054	0.834	0.404	-.081049	.2012071
hr_lper	-.5903265	.0599684	-9.844	0.000	-.7078624	-.4727905
hr_oth	-.6767262	.0659331	-10.264	0.000	-.8059528	-.5474997
hr_unk	-.7902988	.1140601	-6.929	0.000	-1.013853	-.566745
forest	-.7456516	.1817851	-4.102	0.000	-1.101944	-.3893594
mnufct31	.1483412	.0879231	1.687	0.092	-.0239849	.3206673
mnufct1	-.6314268	.121937	-5.178	0.000	-.870419	-.3924347
mnufct2	-.3502012	.1191955	-2.938	0.003	-.58382	-.1165824
mnufct3k	-.23044	.1011906	-2.277	0.023	-.4287699	-.0321101
constrct	-.6439204	.1488858	-4.325	0.000	-.9357311	-.3521096
trnspsw	-.4441881	.0913159	-4.864	0.000	-.623164	-.2652122
comu_ou	-.3755071	.1692127	-2.219	0.026	-.7071579	-.0438562
fin_est	-.6592042	.1132632	-5.820	0.000	-.8811959	-.4372125
bzsrvce	.1957115	.1004198	1.949	0.051	-.0011077	.3925307
ed_hlth	-.1645316	.1181564	-1.392	0.164	-.3961138	.0670506
inf_cult	-.0847461	.1335251	-0.635	0.526	-.3464505	.1769583
urate	-3.212626	.7648505	-4.200	0.000	-4.711706	-1.713547
cmp_int1	.3543612	.045474	7.793	0.000	.2652338	.4434885
single_i	-.1346657	.0495136	-2.720	0.007	-.2317106	-.0376208
_cons	.3411374	.1820014	1.874	0.061	-.0155788	.6978537

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SAMPLE SIZE: 4,918
Log likelihood = -4928.5591

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
CONDITIONAL VACANCY RATE EQUATION:						
cntl1	-.1723419	.1492081	-1.155	0.248	-.4647844	.1201007
cntl2	-.086109	.1598832	-0.539	0.590	-.3994743	.2272563
cntl3	-.27376	.1589383	-1.722	0.085	-.5852734	.0377534
cntl4	-.1158984	.1601062	-0.724	0.469	-.4297009	.197904
cntl5	-.0281938	.161303	-0.175	0.861	-.3443417	.2879542
cntl6	-.1773472	.1718053	-1.032	0.302	-.5140795	.1593851
cntl7	.2902732	.1582203	1.835	0.067	-.0198329	.6003794
cntl8	-.0156869	.1543904	-0.102	0.919	-.3182866	.2869128
cntl9	-.265287	.1456558	-1.821	0.069	-.5507671	.020193
ttl_emp	-.0002847	.000034	-8.380	0.000	-.0003513	-.0002181
innovat1	.0510901	.0603507	0.847	0.397	-.0671951	.1693752
skl_hgh	.1402622	.0530032	2.646	0.008	.0363778	.2441466
unioned	-.3939198	.0660843	-5.961	0.000	-.5234426	-.264397
skl_pct	.3073594	.0882815	3.482	0.000	.1343308	.480388
hr_lper	-.001282	.0775475	-0.017	0.987	-.1532723	.1507084
hr_oth	.1925936	.0897525	2.146	0.032	.0166819	.3685052
hr_unk	-.3464913	.1532025	-2.262	0.024	-.6467626	-.04622
forest	-1.367726	.2233746	-6.123	0.000	-1.805532	-.9299197
mnufct31	-.4792785	.0953072	-5.029	0.000	-.6660771	-.2924798
mnufct1	-1.35384	.1448336	-9.348	0.000	-1.637708	-1.069971
mnufct2	-.5945151	.1258433	-4.724	0.000	-.8411635	-.3478668
mnufct3k	-.7632069	.1073802	-7.108	0.000	-.9736683	-.5527455
constrct	-.4983255	.1872665	-2.661	0.008	-.8653612	-.1312899
trnspsw	-.214923	.1067301	-2.014	0.044	-.4241101	-.005736
comu_ou	-.2130479	.1877519	-1.135	0.256	-.5810348	.154939
fin_est	-.3698622	.1406928	-2.629	0.009	-.645615	-.0941094
bzsrvce	-.361094	.1173703	-3.077	0.002	-.5911357	-.1310524
ed_hlth	-.7740518	.1319987	-5.864	0.000	-1.032764	-.5153391
inf_cult	-.4431771	.1376905	-3.219	0.001	-.7130455	-.1733087
urate	-3.355115	.9640436	-3.480	0.001	-5.244606	-1.465624
cmp_int1	.1050076	.0617741	1.700	0.089	-.0160674	.2260827
single_i	.3510462	.0565759	6.205	0.000	.2401594	.461933
_cons	-3.195989	.2254182	-14.178	0.000	-3.637801	-2.754178
sigma						
_cons	.9703115	.0539242	17.994	0.000	.864622	1.076001
eq4						
_cons	.6081231	.0995543	6.108	0.000	.4130002	.803246

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